ORIGINAL

MOTOROLA

MC14495

CMOS MSI

(LOW-POWER COMPLEMENTARY MOS)

BCD-TO-SEVEN SEGMENT HEXADECIMAL LATCH/DECODER/DRIVER

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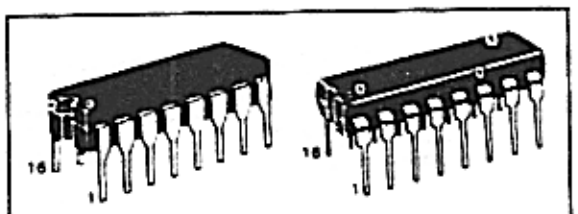
The MC14495 BCD-to-seven segment hexidecimal latch/decoder/driver is constructed with complementary MOS (CMOS) enhancement mode devices and NPN bipolar output drivers in a single monolithic structure. The circuit provides the functions of a 4-bit storage latch. It can be used with LED seven segment displays without resistor interface at 5 volt supply. The resistors of typically 290 ohms are internal to the part.

Applications include MPU systems display driver, instrument display driver, computer/calculator display driver, cockpit display driver, and various clock, watch, and timer uses.

- Low Logic Circuit Power Dissipation
- High-Current Sourcing Outputs With Internal Limiting Resistance
- Latch Storage of Code
- Supply Voltage Range = 4.5 Vdc to 16 Vdc
- Internal Input Level Shift:
  Input +5 CMOS to V_{DD} of +5 to +16 Vdc
  Input +5 V TTL with Pull-up, to V_{DD} of +5 to +16 Vdc

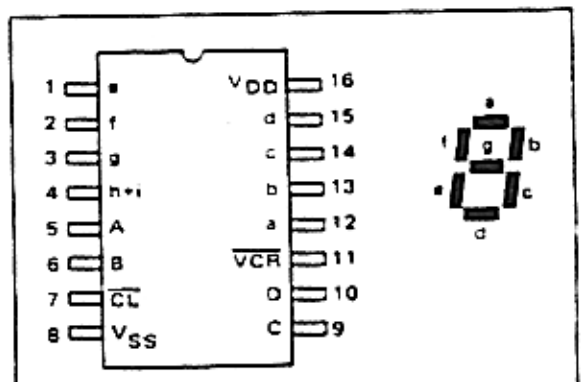


L SUFFIX
CERAMIC PACKAGE
CASE 620

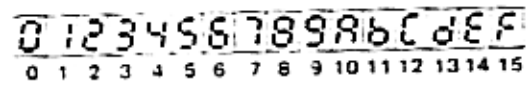
P SUFFIX
PLASTIC PACKAGE
CASE 648

ORDERING INFORMATION

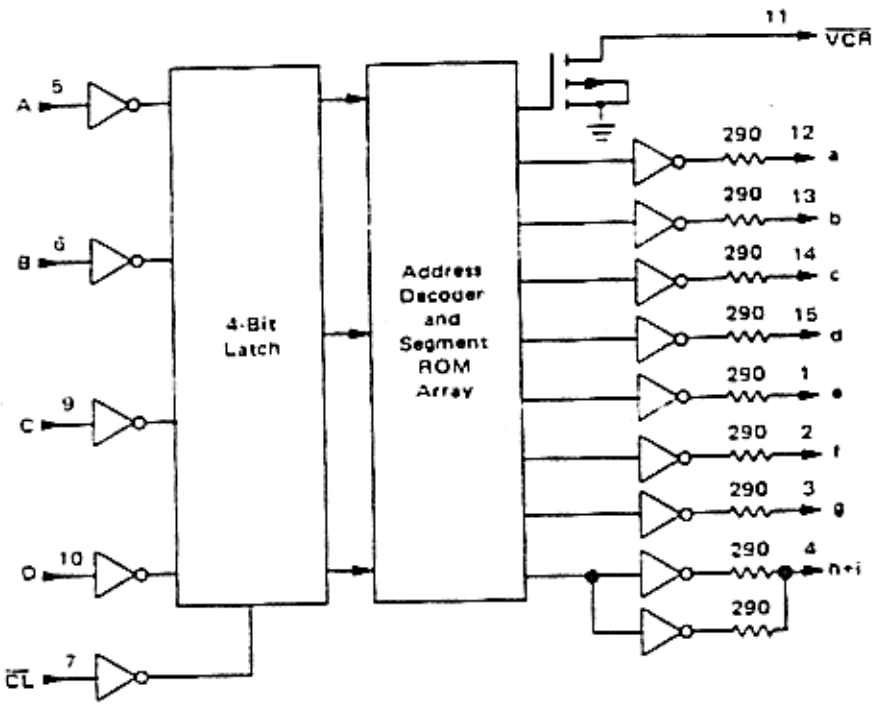
MC14XXX — Suffix Denotes
- L Ceramic Package
- P Plastic Package



ALPHANUMERIC DISPLAY



BLOCK DIAGRAM



TRUTH TABLE

INPUTS				OUTPUTS									
D	C	B	A	a	b	c	d	e	f	g	h+i	$\overline{VCR}$	DISPLAY
0	0	0	0	1	1	1	1	1	1	0	0	Open	0
0	0	0	1	0	1	1	0	0	0	0	0	Open	1
0	0	1	0	1	1	0	1	1	0	1	0	Open	2
0	0	1	1	1	1	1	1	0	0	1	0	Open	3
0	1	0	0	0	1	1	0	0	1	1	0	Open	4
0	1	0	1	1	0	1	1	0	1	1	0	Open	5
0	1	1	0	1	0	1	1	1	1	1	0	Open	6
0	1	1	1	1	1	1	0	0	0	0	0	Open	7
1	0	0	0	1	1	1	1	1	1	1	0	Open	8
1	0	0	1	1	1	1	1	0	1	1	0	Open	9
1	0	1	0	1	1	1	0	1	1	1	1	Open	A
1	0	1	1	0	0	1	1	1	1	1	1	Open	b
1	1	0	0	1	0	0	1	1	1	0	1	Open	C
1	1	0	1	0	1	1	1	1	0	1	1	Open	d
1	1	1	0	1	0	0	1	1	1	1	1	Open	E
1	1	1	1	1	0	0	0	1	1	1	1	0	F

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MAXIMUM RATINGS (Voltages referenced to V_{SS}).

Rating	Symbol	Value	Unit
DC Supply Voltage	V_{DD}	-0.5 to +18	Vdc
Input Voltage, All Inputs	V_{in}	-0.5 to V_{DD} + 0.5	Vdc
DC Current Drain per Input Pin	I	10	mAdc
Operating Temperature Range	T_A	-40 to +85	°C
Storage Temperature Range	T_{stg}	-65 to +150	°C
Maximum Continuous Output Power (Source) per Output @ 25 °C Pins 1, 2, 3, 12, 13, 14, 15 Pin 14	P_{OHmax}	 50 100	mW

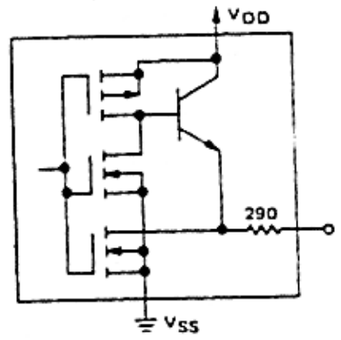
‡$P_{OHmax} = I_{OH} (V_{DD} - V_{OH})$

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields; however, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit. For proper operation it is recommended that V_{in} and V_{out} be constrained to the range $V_{SS} \leq (V_{in}$ or $V_{out}) \leq V_{DD}$.

ELECTRICAL CHARACTERISTICS (All voltages referenced to V_{SS} = 0, T_A -25°C)

Characteristics	Symbol	Condition	Min	Typ	Max	Unit
DC Supply Voltage	V_{DD}		4.5		16	Vdc
Input Voltage	V_{IL}		–		0.8	Vdc
	V_{IH}	V_{DD} = 15V V_{DD} = 5.0V	4.0 3.5		– –	Vdc
Input Current	I_{in}		–		±10	µAdc
Output VCR, Pin 11	I_{OH}	$V_{OH} = V_{DD}$	–		±10	µAdc
Open Drain Output	I_{OL}	V_{OL} = 0.5V, V_{DD} = 5.0V V_{OL} = 0.5V, V_{DD} = 15V	0.2 1.0		– –	mA
Outputs a, b, c, d, e, f, g	I_{OH}	V_{OH} = 2.0V, V_{DD} = 5.0V V_{OH} = 1.5V, V_{DD} = 5.0V V_{OH} = 12V, V_{DD} = 15V V_{OH} = 11.5V, V_{DD} = 15V	-7.5 – -7.5 –		 -11.5 -11.5	mA
	I_{OL}	V_{OL} = 1.0V, V_{DD} = 5.0V V_{OL} = 1.0V, V_{DD} = 15V	0.1 0.5		– –	mA
Output h + i	I_{OH}	V_{OH} = 2.0V, V_{DD} = 5.0V V_{OH} = 1.5V, V_{DD} = 5.0V V_{OH} = 12V, V_{DD} = 15V V_{OH} = 11.5V, V_{DD} = 15V	-15 – -15 –		– -23 – -23	mA
	I_{OL}	V_{OL} = 1V, V_{DD} = 5.0 V V_{OL} = 1.0 V, V_{DD} = 15V	0.2 1.0		– –	mA

OUTPUT CIRCUIT
(Except Pin 11)



INPUT/OUTPUT FUNCTIONS

Segment Driver (a, b, c, d, e, f, g, h, i; Pins 1, 2, 3, 4, 12, 13, 14, 15)

The segment drivers are emitter-follower NPN-transistors. To limit the output current, a resistor typically 290 ohms is integrated internally at each output. Therefore, external resistors are not necessary when driving an LED at the supply voltage of V_{DD} = 5.0 volts.

OUTPUT ($\overline{VCR}$; Pin 11)

This output is activated (goes to low) whenever the address corresponding to program 16 is selected. Otherwise the output is open. See the truth table.

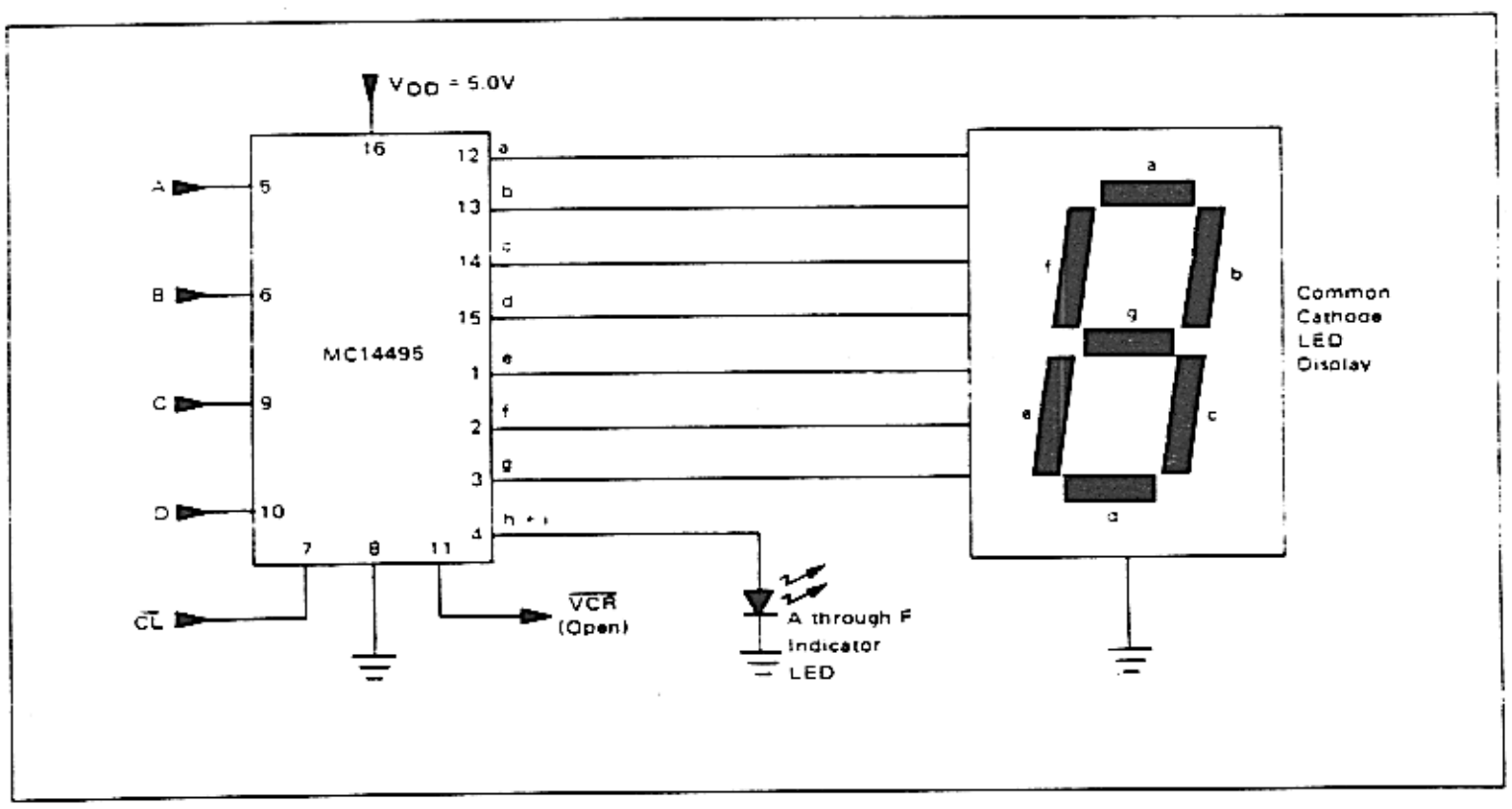
INPUT LATCH (A,B, C, D; Pins 5, 6, 8, 10)

The block diagram is shown on page 1. The inputs A, B, C, and D are fed to a 4-bit latch which is controlled by clock ($\overline{CL}$). Two modes of operation are available.

CLOCK ($\overline{CL}$; Pin 7)

The data on the inputs A, B, C and D will pass through the latch and will be displayed immediately when the clock is low. In this mode of operation the circuit is performing the function of a conventional decoder/driver. The data may be loaded into the latch when $\overline{CL}$ = low and will be latched with the rising edge of $\overline{CL}$. The data will remain stored as long as $\overline{CL}$ is high.

TYPICAL CIRCUIT @ V_{DD} = 5.0V



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